An Analysis of Charter vs. Traditional Public Schools in Utah

Performance Assessments/ 2004 CRT

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RUNNING HEAD: 2004 CHARTER SCHOOL ANALYSIS

An Analysis of Charter vs. Traditional Public Schools in Utah Performance Assessments. Data was gathered from the 2004 CRT. School ID numbers and corresponding schools are found in Appendix A.

Language Arts

Table 1 presents performance scores in mean percent correct for the Language Arts exam. The data in Table 1 show that in 3rd, 5th and 7th grades students in charters school performed significantly better than students in traditional schools in the Language Arts performance tests. Traditional school students outperformed charter school students overall in 10th grade. All statistical tests were completed using analysis of variance (ANOVA) with an alpha of 0.05. In the analysis of both 5th and 10th grade the Levene statistic for homogeneity of variance was significant. This is an indication that the variances among scores between the two groups was significantly different and the statistical significance comparison may be biased.

Chart 1 is a visual representation of these scores. There is a trend for charter students to outperform traditional students in grades 1-8, however, chart 1 shows there is an obvious trend for students in traditional school students to perform better than charter school students in the Language Arts exam in grades 9 -11.

However, it is very important to determine if specific student characteristics are affected by charter vs. traditional school education. Therefore comparisons of special education students and minority students performance in charter and in traditional schools was conducted.. Specifically, we addressed the issue of whether charter school students are performing better than students in traditional schools in close proximity of each other. These analysis were carried out in each of the Language Arts, Mathematics, and Science Criterion Referenced Tests (CRT). To make this determination several Hierarchical Linear Models (HLM) were created.

DATA SET: Elementary (grades1 – 8) LANGUAGE scores

Table 2 displays the schools and the number of students within each school in each geographic proximity that was included in the analyses[1]. In order to be included in the analyses, geographic proximities must have contained at least one charter school and one traditional (non-charter) school. SCHID was the variable used to identify the schools.

schid * geoprox Crosstabulation

Research question 1: Does geographic location effect test scores?

In Table 3 are weighted mean test scores across schools within each geographic location. Proximity means were computed based on the school means within each proximity[1].   The test of whether or not the means of geographic proximities were different from one another was based on a chi-square test of weighted means. These weighted means are true score estimates of each geographic proximity's mean test scores. HLM weights

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[1] Geographic proximity was determined by schools within a 3 mile range of one another for all analysis.

means by the estimated reliability of each geographic proximity's mean. The number of schools within geographic proximity and the number of students within each school within each proximity affected the reliability. Geographic proximities with more schools and more students were generally more reliable. The chi-square test for significant variability of geographic proximity's mean test scores was not significant, $\chi2$ (4) = 4.99, p > .05. There was no evidence that, overall, geographic proximity affected test scores.

Research question 2: Are there differences among school mean test scores within each geographic proximity?

In the Table 4 are the weighted means of each school within each geographic proximity. The chi-square test for significant variability of school mean test scores within geographic proximities was significant, $\chi2$ (27) = 1542.80, p < .05. There were significant differences in mean test scores among schools within geographic proximities. Therefore, schools that are located close to each other (and within districts) are scoring significantly different on the CRT exams.

Research Question 3: Are test scores higher within charter schools versus traditional schools?

The mean of traditional schools was 76.42. The mean of charter schools was 72.38. The difference (4.04) was not significant t(4) = 1.08, p > .05. Therefore, the answer is that there not a significant difference between charter and traditional school CRT exam scores.

SPECIAL EDUCATION

Research Question 4: Did charter schools have an effect on special education on test scores? Did special Ed students within charter schools have higher test scores than special Ed students in traditional schools?

First, a test of the difference between SPED and nonSPED students' mean test scores was conducted. Was the mean SPED student test score (across all schools and geographic proximities) different from the mean nonSPED student test scores (across all schools and geographic proximities)?

The grand mean test score of nonSPED students across schools and geographic proximities was 77.19%.   The grand mean test score of SPED students was 64.19%. The mean difference between test scores of nonSPED students and SPED students across schools and geographic proximities was 12.99%. This difference was significant t(31) = 10.15, p < .05.   Means of SPED and nonSPED students within each school within each geographic proximity are in Table 5. This means that overall nonSPED students are outperforming SPED students.

Second, a test was conducted to determine if there were significant, differences among the differences between SPED students mean test scores, and non-SPED students

mean test scores in different schools within geographic proximities. Did significant variability exist among the differences between the mean scores of non-SPED and SPED students among schools within geographic proximities? This was a test of variability among values in the "difference" column in Table 5.

This test was significant χ2 (30) = 156.03, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of non SPED and SPED students compared to the differences between mean test scores of non SPED and SPED students in other schools across geographic proximity. The significant variability meant that school variables could be added to the model to explain this variability.

Did charter schools accounted for this variability? In other words, was there a significant difference in the difference between test scores of SPED students and non-SPED students in charter versus traditional schools within geographic proximities? (Interaction of School Type x SPED)

Interaction of SCHOOL Type x SPED:

The test of the charter versus traditional school interaction was not significant, t (30) = 0.811, p =.424.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between SPED and nonSPED students' mean test scores among schools across geographic proximities. In other words, the differences between SPED students test scores within a geographic proximity could not be explained by whether a student attended a charter school or traditional school.

ETHNICITY

Research Question 6: Do charter schools have an effect on Ethnicity on test scores? Do minority students within charter schools have higher test scores than minority students in traditional schools?

First, a test of the difference between white and minority students' mean test scores was conducted. Was the mean white student test score (across all schools and geographic proximities) different from the mean minority student test score (across all schools and geographic proximities)?

The grand mean test score of minority students across schools and geographic proximities was 60.68%. The grand mean test score of white students across schools and geographic proximities was 69.30%. The grand mean difference between test scores of minority and white students across schools and geographic proximities was 8.61%. This difference was statistically significant, t(6) = 4.73, p < .05. White students scored approximately 8.61% higher than minority students.

Did significant variability exist among the difference between the mean scores of minority and white students among schools within geographic proximities? This was a test of variability among values in the "difference" column in Table 6. This test was significant χ2 (27) = 62.56, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of minority and white students compared to the differences between mean test scores of minority and white students in other schools. This meant that school variables could be added to the model to explain this variability.

Did charter schools account for this variability? Was there was a difference between the difference between test scores of white students and minority students in charter versus traditional schools within geographic proximities? (Interaction of School Type x ETHNICITY)

Interaction of SCHOOL Type x ETHNICITY:
        The test of the charter versus traditional school interaction was not significant, t (30) = -1.999, p =.054.   However, the interaction approached significance. Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.   In other words, the differences between white and minority students test scores within a geographic proximity could not be explained by whether a student attended a charter school or traditional school.
        Did significant variability exist among the difference between the mean scores of minority and white students among geographic proximities? YES, $\chi2$ (4) = 17.33, p < .05. In some geographic proximities the differences between White and minority students' test scores were larger than in other geographic proximities.

DATA SET: High School (grades 9 – 12) LANGUAGE scores

Table 7 displays the schools and the number of students within each school in each geographic proximity that was included in the analyses. In order to be included in the analyses, geographic proximities must have contained at least one charter school and one traditional (traditional) school. SCHID was the variable used to identify the schools.

schid * geoprox Crosstabulation

Research question 1: Does geographic location effect test scores?

        In Table 8 are weighted mean test scores across schools within each geographic location. Proximity means were computed based on the school means within each proximity. The test of whether or not the means of geographic proximities were different from one another was based on a chi-square test of weighted means. These weighted means are true score estimates of each geographic proximity's mean test scores. HLM weights means by the estimated reliability of each geographic proximity's mean. The number of schools within geographic proximity and the number of students within each school within each proximity affected the reliability. Geographic proximities with more schools and more students were generally more reliable. The chi-square test for significant variability of geographic proximity's mean test scores was not significant, $\chi2$ (6) = 7.14, p > .05. There was no evidence that, overall, geographic proximity affected test scores.

Research question 2: Are there differences among school mean test scores within each geographic proximity?

In Table 9 are the weighted means of each school within each geographic proximity. The chi-square test for significant variability of school mean test scores <u>within</u> geographic proximities was significant, $\chi 2$ (14) = 330.36, p < .05. There were significant differences in mean test scores among schools within geographic proximities.

Research Question 3: Are test scores higher within charter schools versus traditional schools?

The mean of traditional schools was 63.15. The mean of charter schools was 49.95. The difference (-13.21) was not significant t(6) = -1.74, p > .05. Therefore, traditional and charter high school students did not score significantly different on the CRT Mathematics exam.

SPECIAL EDUCATION

Research Question 4: Did charter schools have an effect on special education on test scores? Did special Ed students within charter schools have higher test scores than special Ed students in traditional schools?

First, a test of the difference between SPED and nonSPED students' mean test scores was conducted. Was the mean SPED student test score (across all schools and geographic proximities) different from the mean nonSPED student test scores (across all schools and geographic proximities)? The grand mean test score of nonSPED students across schools and geographic proximities was 60.87%.   The grand mean test score of SPED students was 36.95%. The mean difference between test scores of nonSPED students and SPED students across schools and geographic proximities was 23.92%. This difference was significant t(20) = 12.31, p < .05. Means of SPED and nonSPED students within each school within each geographic proximity are in Table 10. This means that overall nonSPED students are outperforming SPED students on the CRT Mathematics exam.

Second, a test was conducted to determine if there were significant, differences among the differences between SPED students mean test scores, and non-SPED students mean test scores in different schools within geographic proximities. Did significant variability exist among the differences between the mean scores of non-SPED and SPED students among schools within geographic proximities? This was a test of variability among values in the "difference" column in Table 10.

This test was significant $\chi 2$ (18) = 81.41, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of non SPED and SPED students compared to the differences between mean test scores of non SPED and SPED students in other schools across geographic.   The significant variability meant that school variables could be added to the model to explain this variability.

Again we are interested to determine if charter schools accounted for this variability? Therefore we set out to determine if there was a difference between the difference between test scores of SPED students and non-SPED students in charter versus traditional schools within geographic proximities? (Interaction of School Type x SPED)

Interaction of SCHOOL Type x SPED: The test of the charter versus traditional school interaction was not significant, t (19) = .701, p =.492.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.   In other words, the differences between SPED students test CRT Mathematics scores within a geographic proximity could not be explained by whether a student attended a charter school or traditional school.

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ETHNICITY

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Research Question 5: Do charter schools have an effect on Ethnicity on test scores? Do minority students within charter schools have higher test scores than minority students in traditional schools?

First, a test of the difference between white and minority students' mean test scores was conducted. Was the mean white student test score (across all schools and geographic proximities) different from the mean minority student test score (across all schools and geographic proximities)? The grand mean test score of white students across schools and geographic proximities was 60.68%. The grand mean test score of minority students across schools and geographic proximities was 49.76%. The grand mean difference between test scores of minority and white students across schools and geographic proximities was 10.92%. This difference was statistically significant, t(6) = 5.24, p < .05. White students scored approximately 10.92% higher than minority students.

Did significant variability exist among the difference between the mean scores of minority and white students among schools within geographic proximities? This was a test of variability among values in the "difference" column in Table 11. This test was significant $\chi 2$ (20) = 172.42, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of minority and white students compared to the differences between mean test scores of minority and white students in other schools.   (See Table 11)This meant that school variables could be added to the model to explain this variability.

Did charter schools account for this variability? Was there was a difference between the difference between test scores of white students and minority students in charter versus traditional schools within geographic proximities? (Interaction of School Type x ETHNICITY)

Interaction of SCHOOL Type x ETHNICITY: The test of the charter versus traditional school interaction was not significant, t (6) = -1.74, p =.132.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences

between minority and White students' mean test scores among schools across geographic proximities.

Did significant variability exist among the difference between the mean scores of minority and white students among geographic proximities? No, $\chi2$ (6) = 9.85, p > .05. Meaning that within a geographic region minority students did not score significantly different from white students throughout Utah high schools.

Mathematics

The data in Table 12 show that 3rd, $5^{th,}$ and 7th. grades students in charter schools performed significantly better than students in traditional schools in the Mathematics performance tests. In 10th grade traditional students outperformed charter school students. Chart 2 is a visual representation of these scores. As in the Language Arts test there is a tendency for traditional school students in the higher grades (10th through 12th) to perform better than charter school students. In fact., the differences are significant in 10th grade and close to significant in 11th and 12th as indicated in table 5. Chart 2 presents the data

As in the Language Arts test, we may be dealing with confounding variables, which are not represented by the descriptive statistics just described. It is important again to see what impact charter schools are having on special education students. Table 6 presents the number of students completing the test, percent correct means, standard deviation, standard error of the test, minimum and maximum scores for special education students in the traditional and charter schools throughout the state. Due to the largely unequal sample sizes, it is difficult to infer that there is a significant difference in means. There is however, a tendency for special education students in the charter schools to perform better on the math exams than special education students in traditional schools.

DATA SET: ELEMENTARY MATH scores

Table 13 contains the data the schools and the number of students within each school in each geographic proximity that was included in the analyses. In order to be included in the analyses, geographic proximities must have contained at least one charter school and one traditional (traditional) school. SCHID was the variable used to identify the schools.

schid * geoprox Crosstabulation

Research question 1: Does geographic location effect test scores?

In table 14 are weighted mean test scores across schools within each geographic location. Proximity means were computed based on the school means within each proximity.   The test of whether or not the means of geographic proximities were different from one another was based on a chi-square test of weighted means. These weighted means are true score estimates of each geographic proximity's mean test scores. HLM weights means by the estimated reliability of each geographic proximity's mean. The number of schools within geographic proximity and the number of students within each school within each proximity

affected the reliability. Geographic proximities with more schools and more students were generally more reliable. The chi-square test for significant variability of geographic proximity's mean test scores was significant, $\chi 2$ (4) = 103.28, p < .05. There was evidence that, overall, geographic proximity affected test scores.

Research question 2: Are there differences among school mean test scores within each geographic proximity?

Table 15 contains the weighted means of each school within each geographic proximity. The chi-square test for significant variability of school mean test scores <u>within</u> geographic proximities was significant, $\chi 2$ (14) = 830.99, p < .05. There were significant differences in mean test scores among schools within geographic proximities.

Research Question 3: Are test scores higher within charter schools versus traditional schools?

The mean of traditional schools was 80.39%. The mean of charter schools was 70.37. The difference (-10.03) is significant t(30) = -2.33, p < .05.

SPECIAL EDUCATION

Research Question 4: Did charter schools have an effect on special education on test scores? Did special Ed students within charter schools have higher test scores than special Ed students in traditional schools?

First, a test of the difference between SPED and nonSPED students' mean test scores was conducted. The question of interest here is, was the mean SPED student test score (across all schools and geographic proximities) different from the mean nonSPED student test scores (across all schools and geographic proximities)?_The grand mean test score of nonSPED students across schools and geographic proximities was 79.10%.   The grand mean test score of SPED students was 68.11. The mean difference between test scores of nonSPED students and SPED students across schools and geographic proximities was 10.99%. This difference was significant t(31) = 9.74, p < .05.   Means of SPED and nonSPED students within each school within each geographic proximity are in table 16.

Second, a test was conducted to determine if there were significant, differences among the differences between SPED students mean test scores, and non-SPED students mean test scores in different schools within geographic proximities. Did significant variability exist among the differences between the mean scores of non-SPED and SPED students among schools within geographic proximities? This was a test of variability among values in the "difference" column in table 16

This test was significant $\chi 2$ (30) = 110.23, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of non SPED and SPED students compared to the differences between mean test scores of non SPED and SPED students in other schools within geographic proximities.   The significant variability meant that school variables could be added to the model to explain this variability.

Did charter schools accounted for this variability? Was there was a difference between the difference between test scores of SPED students and non-SPED students in charter versus traditional schools within geographic proximities? (Interaction of School Type x SPED)

<u>Interaction of SCHOOL Type x SPED</u>: The test of the charter versus traditional school interaction was not significant, t (30) = -1.308, p =.201.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.

The next question to answer is did significant variability exist among the difference between the mean scores of non-sped and sped students in charter vs. traditional schools among geographic proximities? There was not significant variability among differences between test scores of SPED and non SPED students in charter vs. non charter schools among geographic proximities, $\chi 2$ (4) = 9.09, p > .05.

ETHNICITY

Research Question 5: Do charter schools have an effect on Ethnicity on test scores? Do minority students within charter schools have higher test scores than minority students in traditional schools?

First, a test of the difference between white and minority students' mean test scores was conducted. In order to determine if the mean white student test score (across all schools and geographic proximities) different from the mean minority student test score (across all schools and geographic proximities)?

The grand mean test score of white students across schools and geographic proximities was 79.78%. The grand mean test score of minority students across schools and geographic proximities was 73.59%. The grand mean difference between test scores of minority and white students across schools and geographic proximities was 6.19%. This difference was statistically significant, t(31) = 5.88, p < .05. White students scored approximately 6.19% higher than minority students.

Did significant variability exist among the difference between the mean scores of minority and white students among schools within geographic proximities? This was a test of variability among values in the "difference" column above.
This test was significant $\chi 2$ (31) = 151.74, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of minority and white students compared to the differences between mean test scores of minority and white students in other schools.   This meant that school variables could be added to the model to

explain this variability. Did charter schools accounted for this variability? Was there was a difference between the difference between test scores of white students and minority students in charter versus traditional schools within geographic proximities? (Interaction of School Type x ETHNICITY)

Interaction of charter SCHOOL TYPE x ETHNICITY: The test of the charter school interaction was not significant, t (30) = -1.237, p =.226.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.   Did significant variability exist among the difference between the mean scores of minority and white students among geographic proximities? No, $\chi2$ (4) = 3.05, p > .05.

DATA SET: High School MATH scores

Table 16 contains the schools and the number of students within each school in each geographic proximity that was included in the analyses. In order to be included in the analyses, geographic proximities must have contained at least one charter school and one traditional (traditional) school. SCHID was the variable used to identify the schools.

schid * geoprox Crosstabulation

Research question 1: Does geographic location effect test scores?

Table 17 displays the weighted mean test scores across schools within each geographic location. Proximity means were computed based on the school means within each proximity. The test of whether or not the means of geographic proximities were different from one another was based on a chi-square test of weighted means. These weighted means are true score estimates of each geographic proximity's mean test scores. HLM weights means by the estimated reliability of each geographic proximity's mean. The number of schools within geographic proximity and the number of students within each school within each proximity affected the reliability. Geographic proximities with more schools and more students were generally more reliable. The chi-square test for significant variability of geographic proximity's mean test scores was not significant, $\chi2$ (6) = 4.30, p > .05. There was no evidence that, overall, geographic proximity affected test scores.

Research question 2: Are there differences among school mean test scores within each geographic proximity?

Table 18 contains the weighted means of each school within each geographic proximity.

The chi-square test for significant variability of school mean test scores <u>within</u> geographic proximities was significant, $\chi2 (14) = 830.99$, $p < .05$. There were significant differences in mean test scores among schools within geographic proximities.

Research Question 3: Are test scores higher within charter schools versus traditional schools?

The mean of traditional schools was 50.69. The mean of charter schools was 41.76. The difference (-8.93) was not significant $t(6) = -1.342$, $p > .05$.

<p align="center">SPECIAL EDUCATION</p>

Research Question 4: Did charter schools have an effect on special education on test scores? Did special Ed students within charter schools have higher test scores than special Ed students in traditional schools?

First, a test of the difference between SPED and nonSPED students' mean test scores was conducted. Was the mean SPED student test score (across all schools and geographic proximities) different from the mean nonSPED student test scores (across all schools and geographic proximities)?

The grand mean test score of nonSPED students across schools and geographic proximities was 51.88%.   The grand mean test score of SPED students was 39.26. The mean difference between test scores of nonSPED students and SPED students across schools and geographic proximities was 12.62%. This difference was significant $t(4) = 11.29$, $p < .05$.   Means of SPED and nonSPED students within each school within each geographic proximity are in table 19.

Second, a test was conducted to determine if there were significant, differences among the differences between SPED students mean test scores, and non-SPED students mean test scores in different schools within geographic proximities. Did significant variability exist among the differences between the mean scores of non-sped and sped students among schools within geographic proximities? This was a test of variability among values in the "difference" column in table 19.

This test was significant $\chi2 (11) = 36.84$, $p < .05$. In some schools within geographic proximities, there were larger differences between mean test scores of non SPED and SPED students compared to the differences between mean test scores of non SPED and SPED students in other schools within geographic proximities.   The significant variability meant that school variables could be added to the model to explain this variability.

Did charter schools accounted for this variability? Was there was a difference between the difference between test scores of SPED students and non-SPED students in charter versus traditional schools within geographic proximities? (Interaction of School Type x SPED)

Interaction of SCHOOL Type x SPED: The test of the charter versus traditional school interaction was not significant, t (6) = 0.88, p =.411.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.

ETHNICITY

Research Question 5: Do charter schools have an effect on Ethnicity on test scores? Do minority students within charter schools have higher test scores than minority students in traditional schools?

First, a test of the difference between white and minority students' mean test scores was conducted. Was the mean white student test score (across all schools and geographic proximities) different from the mean minority student test score (across all schools and geographic proximities)?
        The grand mean test score of white students across schools and geographic proximities was 50.41%. The grand mean test score of minority students across schools and geographic proximities was 40.88%. The grand mean difference between test scores of minority and white students across schools and geographic proximities was 9.53%. This difference was statistically significant, t(6) = 8.043, p < .05. White students scored approximately 9.53% higher than minority students.
        Did significant variability exist among the difference between the mean scores of minority and white students among schools within geographic proximities? This was a test of variability among values in the "difference" column in table 20.
This test was significant $\chi2$ (14) = 29.31, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of minority and white students compared to the differences between mean test scores of minority and white students in other schools.   This meant that school variables could be added to the model to explain this variability.
        Did charter schools accounted for this variability? Was there was a difference between the difference between test scores of white students and minority students in charter versus traditional schools within geographic proximities? (Interaction of School Type x ETHNICITY)

Interaction of SCHOOL Type x ETHNICITY: The test of the charter versus traditional school interaction was not significant, t (19) = -768, p =.452. Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.
        Did significant variability exist among the difference between the mean scores of minority and white students among geographic proximities? No, $\chi2$ (6) = 9.85, p > .05. Within some geographic proximities, the difference between minority and white students test

scores were larger than the difference between minority and white students test scores in other geographic proximities.

Science

Table 26 presents performance scores in mean percent correct for the Science exam. The data in Table 26 show that in 4th, 7th and 9th grades students in charters school performed significantly better than students in traditional schools in the Science performance tests. Traditional school students outperformed charter school students overall in 10th, 11th, and 12th grades. All statistical tests were completed using analysis of variance (ANOVA) with an alpha of 0.05. In the analysis of both 4th and 10th grade the Levene statistic for homogeneity of variance was significant. This is an indication that the variances among scores between the two groups were significantly different and the statistical significance comparison may be biased.

Chart 3 is a visual representation of these scores. Appendix A provides the F and p values for the ANOVA for charter vs. traditional schools across districts. There is a trend for charter students to outperform traditional students in grades 1-8, however, chart 1 shows there is an obvious trend for students in traditional school students to perform better than charter school students in the Language Arts exam in grades 9 -11.

However, it is very important to determine if charter school special education students are performing better than special education students in traditional schools. To make this determination several Hierarchical Linear Models (HLM) were created.

DATA SET: ELEMENTARY School Science scores

Table 27 contains the schools and the number of students within each school in each geographic proximity that were included in the analyses. In order to be included in the analyses, each geographic proximity must have contained at least one charter school and one traditional (traditional) school. SCHID was the variable used to identify the schools.

schid * geoprox Crosstabulation

Research question 1: Does geographic location effect test scores?

In table 28 are the weighted mean test scores across schools within each geographic location. Proximity means were computed based on the school means within each proximity.   The test of whether or not the means of geographic proximities were different from one another was based on a chi-square test of weighted means. These weighted means are true score estimates of each geographic proximity's mean test scores. HLM weights means by the estimated reliability of each geographic proximity's mean. The number of schools within geographic proximity and the number of students within each school within each proximity affected the reliability. Geographic proximities with more schools and more students were generally more reliable. The chi-square test for significant variability of geographic

proximity's mean test scores was not significant, $\chi 2$ (4) = 1.71, p > .05. There was no evidence that, overall, geographic proximity affected test scores.

Research question 2: Are there differences among school mean test scores within each geographic proximity?

In table 29 are the weighted means of each school within each geographic proximity. The chi-square test for significant variability of school mean test scores <u>within</u> geographic proximities was significant, $\chi 2$ (26) = 922.12, p < .05. There were significant differences in mean test scores among schools within geographic proximities.

Research Question 3: Are test scores higher within charter schools versus traditional schools?

The mean of traditional schools was 70.62. The mean of charter schools was 72.92%. The difference (2. 29%) was not significant t(4) = 0 .565, p > .05.

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SPECIAL EDUCATION

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Research Question 4: Did charter schools have an effect on special education on test scores? Did special Ed students within charter schools have higher test scores than special Ed students in traditional schools?

First, a test of the difference between SPED and nonSPED students' mean test scores was conducted. Was the mean SPED student test score (across all schools and geographic proximities) different from the mean nonSPED student test scores (across all schools and geographic proximities)?

   The grand mean test score of nonSPED students across schools and geographic proximities was 72.06.   The grand mean test score of SPED students was 59.80%. The mean difference between test scores of nonSPED students and SPED students across schools and geographic proximities was 12.26%. This difference was significant t(4) = 7.25, p < .05.

   Means of SPED and nonSPED students within each school within each geographic proximity are in table 30. Second, a test was conducted to determine if there were significant differences among the differences between SPED students mean test scores and non-SPED students mean test scores in different schools within geographic proximities. Did significant variability exist among the difference between the mean scores of non-SPED and SPED students among schools within geographic proximities? This was a test of variability among values in the "difference" column above. This test was significant $\chi 2$ (25) = 133.77, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of non SPED and SPED students compared to the differences between mean test

scores of non SPED and SPED students in other schools within geographic proximities.   The significant variability meant that school variables could be added to the model to explain this variability.

Did charter schools accounted for this variability? Was there was a difference between the difference between test scores of SPED students and non-SPED students in charter versus traditional schools within geographic proximities? (Interaction of School Type x SPED)

Interaction of SCHOOL Type x SPED: The test of the charter versus traditional school interaction was not significant, t (29) = -.410, p =.684.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.

ETHNICITY

Research Question 6: Do charter schools have an effect on Ethnicity on test scores? Do minority students within charter schools have higher test scores than minority students in traditional schools?

First, a test of the difference between white and minority students' mean test scores was conducted. Was the mean white student test score (across all schools and geographic proximities) different from the mean minority student test score (across all schools and geographic proximities)?

The grand mean test score of white students across schools and geographic proximities was 73.84%. The grand mean test score of minority students across schools and geographic proximities was 63.31%. The grand mean difference between test scores of minority and white students across schools and geographic proximities was 10.53%. This difference was statistically significant, t(4) = 8.56, p < .05. White students scored approximately 10.53% higher than minority students.

Did significant variability exist among the difference between the mean scores of minority and white students among schools within geographic proximities? This was a test of variability among values in the "difference" column in table 31.

This test was significant $\chi 2$ (26) = 166.05, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of minority and white students compared to the differences between mean test scores of minority and white students in other schools.   This meant that school variables could be added to the model to explain this variability.

Did charter schools account for this variability? Was there was a difference between the difference between test scores of white students and minority students in charter versus traditional schools within geographic proximities? (Interaction of School Type x ETHNICITY)

Interaction of charter SCHOOL TYPE x ETHNICITY: The test of the charter versus traditional school interaction was not significant, t (29) = -1.67, p =.105.   Some school

characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.

Did significant variability exist among the difference between the mean scores of minority and white students among geographic proximities? No, $\chi2$ (4) = 2.44, p > .05.

DATA SET: High School Science scores

Table 33 contains the schools and the number of students within each school in each geographic proximity that were included in the analyses. In order to be included in the analyses, each geographic proximity must have contained at least one charter school and one traditional (traditional) school. SCHID was the variable used to identify the schools.

schid * geoprox Crosstabulation

Research question 1: Does geographic location effect test scores?

In table 34 below are mean test scores across schools within each geographic location. Proximity means were computed based on the school means within each proximity.   There are two means reported for each proximity. One proximity mean is a weighted mean and one is an unweighted mean. The test of whether or not the means of geographic proximities were different from one another was based on a chi-square test of weighted means. These weighted means are true score estimates of each geographic proximity's mean test scores. HLM weights means by the estimated reliability of each geographic proximity's mean. The number of schools within geographic proximity and the number of students within each school within each proximity affected the reliability. Geographic proximities with more schools and more students were generally more reliable. The chi-square test for significant variability of geographic proximity's mean test scores was not significant, $\chi2$ (4) = 3.29, p > .05. There was no evidence that, overall, geographic proximity affected test scores.

Research question 2: Are there differences among school mean test scores within each geographic proximity?

In the table 35 are the weighted means of each school within each geographic proximity.

The chi-square test for significant variability of school mean test scores <u>within</u> geographic proximities was significant, $\chi2$ (12) = 1134.01, p < .05. There were significant differences in mean test scores among schools within geographic proximities.

Research Question 3: Are test scores higher within charter schools versus traditional schools?

The mean of traditional schools was 64.36. The mean of charter schools was 62.21. The difference (-2. 15) was not significant t(4) = -.0542, p > .05.

SPECIAL EDUCATION

Research Question 4: Did charter schools have an effect on special education on test scores? Did special ed students within charter schools have higher test scores than special ed students in traditional schools?

First, a test of the difference between SPED and nonSPED students' mean test scores was conducted. Was the mean SPED student test score (across all schools and geographic proximites) different from the mean nonSPED student test scores (across all schools and geographic proximities)?

   The grand mean test score of nonSPED students across schools and geographic proximities was 64.70.   The grand mean test score of SPED students was 47.21. The mean difference between test scores of nonSPED students and SPED students across schools and geographic proximities was 17.49%. This difference was significant t(4) = -7.47, p < .05. Means of SPED and nonSPED students within each school within each geographic proximity are in table 36.

   Second, a test was conducted to determine if there were significant differences among the differences between SPED students mean test scores and non SPED students mean test scores in different schools within geographic proximities. Did significant variability exist among the difference between the mean scores of non SPED and SPED students among schools within geographic proximities? This was a test of variability among values in the "difference" column above.

   This test was significant χ^2 (9) = 63.43, p < .05. In some schools within geographic proximities, there were larger differences between mean test scores of non SPED and SPED students compared to the differences between mean test scores of non SPED and SPED students in other schools within geographic proximities.   The significant variability meant that school variables could be added to the model to explain this variability.

   Did charter schools accounted for this variability? Was there was a difference between the difference between test scores of SPED students and non SPED students in charter versus non charter schools within geographic proximities? (Interaction of School Type x SPED)

Interaction of SCHOOL Type x SPED: The test of the charter versus traditional school interaction was not significant, t (15) = 1.108, p =.286.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.

ETHNICITY

Research Question 5: Do charter schools have an effect on Ethnicity on test scores? Do minority students within charter schools have higher test scores than minority students in traditional schools?

First, a test of the difference between white and minority students' mean test scores was conducted. Was the mean white student test score (across all schools and geographic proximites) different from the mean minority student test score (across all schools and geographic proximities)? The grand mean test score of white students across schools and geographic proximities was 66.29%. The grand mean test score of minority students across schools and geographic proximities was 55.09%. The grand mean difference between test scores of minority and white students across schools and geographic proximities was 11.20%. This difference was statistically significant, $t(4) = 6.117$, $p < .05$. White students scored approximately 11.2% higher than minority students.

Did significant variability exist among the difference between the mean scores of minority and white students among schools within geographic proximities? This was a test of variability among values in the "difference" column in table 37. This test was significant $\chi 2$ $(12) = 26.02$, $p < .05$. In some schools within geographic proximities, there were larger differences between mean test scores of minority and white students compared to the differences between mean test scores of minority and white students in other schools.   This meant that school variables could be added to the model to explain this variability.

Did charter schools account for this variability? Was there was a difference between the difference between test scores of white students and non white students in charter versus non charter schools within geographic proximities? (Interaction of School Type x ETHNICITY)

Interaction of SCHOOL Type x ETHNICITY: The test of the charter versus traditional school interaction was not significant, $t(15) = 1.11$, $p = .286$.   Some school characteristic or characteristics, other than charter vs. traditional schools was accounting for the differences between minority and White students' mean test scores among schools across geographic proximities.

Did significant variability exist among the difference between the mean scores of minority and white students among geographic proximities? Yes, $\chi 2$ $(4) = 12.09$, $p < .05$. Within some geographic proximities, the difference between minority and white students test scores were larger than the difference between minority and white students test scores in other geographic proximities.